What is claimed is:

1. A membrane based on a polymeric nonwoven, said nonwoven comprising on and in said nonwoven a ceramic coating which comprises at least one oxide selected from Al_2O_3, TiO_2, ZrO_2 or SiO_2,
characterized in that
this one coating comprises at least two fractions of oxides selected from Al_2O_3, ZrO_2, TiO_2 and/or SiO_2, the first ceramic fraction having been obtained from a sol and the second fraction comprising particles having an average particle size in the range from 200 nm to 5 µm and the first fraction being present as a layer on the particles of said second fraction and said first fraction comprising from 1 to 30 parts by mass of said coating, said second fraction comprising from 5 to 94 parts by mass of the ceramic coating and also a silicon network, the silicon of said network being bonded via oxygen atoms to said oxides of said ceramic coating, via organic radicals to said polymeric nonwoven and via at least one carbon chain to a further silicon.

2. A membrane according to claim 1,
characterized in that
it is obtained by a process as per at least one of claims 14 to 26.

3. A membrane as per claim 1 or 2,
characterized in that
said first ceramic fraction comprises particles having an average particle size of less than 20 nm and has been prepared via a particulate sol.

4. A membrane as per claim 1 or 2,
characterized in that
said first ceramic fraction contains particles or an inorganic network of the ceramic material which were prepared via a polymeric sol.

5. A membrane as per at least one of claim 1 to 4,
characterized in that

said first ceramic fraction has a layer thickness of less than 100 nm on said particles of said second fraction.

6. A membrane according to at least one of claim 1 to 5,
characterized in that
said second particle fraction contains particles having a BET surface area of less than 5 m^2/g.

7. A membrane according to at least one of claims 1 to 6,
characterized in that
said polymeric nonwoven comprises polymeric fibers selected from fibers of polyethylene, polyacrylonitrile, polypropylene, polyamide and/or polyester.

8. A membrane as per at least one of claim 1 to 7,
characterized in that
said coating comprises at least three fractions of oxides selected from Al_2O_3, ZrO_2, TiO_2 and/or SiO_2, third fraction comprising particles having an average primary particle size in the range from 10 nm to 199 nm and said first fraction being present as a layer on said particles of said second and third fractions and said first fraction comprising from 1 to 30 parts by mass of said ceramic coating, said second fraction comprising from 30 to 94 parts by mass of said ceramic coating and said third fraction comprising from 5 to 50 parts by mass of said ceramic coating.

9. A membrane as per claim 8,
characterized in that
said third particle fraction contains particles having a BET surface area in the range from 10 to 1 000 m^2/g.

10. A membrane as per claim 8 or 9,
characterized in that
said third particle fraction contains particles having an average aggregate or agglomerate size in the range from 1 to 25 μm.

11. A membrane as per at least one of claims 8 to 10,
characterized in that
said second fraction comprises particles having an average primary particle size in the range from 30 nm to 60 nm and said third fraction comprises particles having an average particle size in the range from 1 to 4 μm and said first fraction comprises from 10 to 20 parts by mass of said ceramic coating, said second fraction comprises from 10 to 30 parts by mass of said ceramic coating and said third fraction comprises from 40 to 70 parts by mass of said ceramic coating.

12. A membrane as per at least one of claims 8 to 11,
characterized in that
said particles of said third fraction are zirconium oxide or preferably silicon oxide particles and said particles of said second fraction are aluminum oxide particles and said first ceramic fraction is formed from silicon oxide.

13. A membrane as per at least one of claims 1 to 12,
characterized in that
it is bendable down to a radius of 5 mm without defects arising as a result.

14. A process for producing a membrane, which process comprises providing a polymeric nonwoven with a ceramic coating in and on said nonwoven by a suspension being applied onto and into said polymeric nonwoven and being solidified on and in said nonwoven by heating one or more times, said suspension comprising a sol and at least one fraction of oxidic particles selected from the oxides of the elements Al, Zr, Ti and/or Si and said suspension having added to it prior to application a mixture of at least two different adhesion promoters which are each based on an alkylalkoxysilane of the general formula I

$$R_x\text{-}Si(OR)_{4-x} \qquad (I)$$

where x = 1 or 2 and R = organic radical, the R radicals being the same or different,
said adhesion promoters being selected so that both the adhesion promoters comprise alkyl radicals which at least each comprises a reactive group as a substituent, said reactive group

on said alkyl radical of one adhesion promoter reacting with said reactive group of the other adhesion promoter during the one or more heating steps to form a covalent bond, or one or more adhesion promoters as per the formula **I**, which have reactive groups which are capable of reacting under the action of UV radiation to form a covalent bond, the addition of an adhesion promoter which reacts under the action of UV radiation being followed by one or more treatments with UV radiation after said suspension has been applied to said polymeric nonwoven.

15. A process according to claim 14,
wherein
the fibers of said polymeric nonwoven used are selected from polyester, polyethylene, polypropylene and/or polyamide.

16. A process according to claim 14 or 15,
wherein
said suspension comprises at least one sol of a compound of the elements Al, Si, Ti or Zr and is prepared by suspending said fraction of oxidic particles in at least one of these sols.

17. A process according to at least one of claims 14 to 16,
wherein
said suspension comprises a polymeric sol of a compound of said silicon.

18. A process according to at least one of claims 14 to 17,
wherein
said sols are obtained by hydrolyzing a precursor compound of the elements Al, Zr, Ti or Si with water or an acid or a combination thereof.

19. A process according to at least one of claims 14 to 18,
wherein
the mass fraction of the suspended particle fractions is from 1.5 to 150 times the employed first fraction from said sol.

20. A process according to at least one of claims 14 to 19,
wherein
3-aminopropyltriethoxysilane (AMEO) and 3-glycidyloxytrimethoxysilane (GLYMO) are used as adhesion promoters capable of forming a covalent bond on heating.

21. A process according to at least one of claims 14 to 19,
wherein
methacryloyloxypropyltrimethoxysilane (MEMO) is used as an adhesion promoter capable of forming a covalent bond under the action of UV radiation.

22. A process according to claim 21,
wherein
the treatment with UV radiation is effected before or after said at least single heating.

23. A process according to at least one of claims 14 to 22,
wherein
said suspension present on and in said polymeric nonwoven is solidified by heating to a temperature in the range from 50 to 350°C.

24. A process according to claim 23,
wherein
on a polymeric nonwoven comprising polyester fibers said suspension is heated at a temperature in the range from 200 to 220°C for from 0.5 to 10 minutes.

25. A process according to claim 23,
wherein
on a polymeric nonwoven comprising polyamide fibers said suspension is heated at a temperature in the range from 130 to 180°C for from 0.5 to 10 minutes.

26. A process according to any one of claims 14 to 25,
wherein
said suspension comprises at least one sol and at least two fractions of oxidic particles

selected from the oxides of the elements Al, Zr, Ti and/or Si and at least one fraction has an average primary particle size in the range from 10 nm to 199 nm and comprises from 5 to 50 parts by mass of said suspension and at least one fraction comprises primary particles having an average particle size in the range from 200 nm to 5 μm and comprises from 30 to 94 parts by mass of said suspension.

27. The use of a membrane as per at least one of claims 1 to 13 as a filtration membrane or as an electrical separator, although when used as a separator the membranes are free of any titanium compounds.

28. A lithium battery comprising a membrane as per at least one of claims 1 to 13 as a separator.

29. Filtration apparatus comprising a membrane as per at least one of claims 1 to 13.